

Claims

What is claimed is:

1. A method of programming a non-volatile memory array using suspend and resume commands comprising:
  - (a) pre-defining a plurality of break points amidst a duration of a programming pulse of fixed duration;
  - (b) beginning loading of a memory array with a program or data during the programming pulse;
  - (c) issuing a suspend request during the programming pulse;
  - (d) continuing loading of the memory array until a break point occurring after the suspend request, then suspending said loading;
  - (e) issuing a resume request to again continue loading of the memory array;
  - (f) repeating steps (c) to (e) until the programming pulse is complete.
2. The method of claim 1 wherein the number of break points exceeds the number of suspend requests.
3. The method of claim 1 further defined by beginning loading of the memory array coincidentally upon raising of a programming voltage at an onset of the programming pulse.
4. The method of claim 3 further defined by lowering the programming voltage after a break point occurs after the suspend request.

5. The method of claim 4 wherein the lowered programming voltage is a ground state voltage.

6. The method of claim 1 wherein the break points are uniformly spaced in the programming pulse.

7. The method of claim 1 wherein the break points are non-uniformly spaced in the programming pulse.

8. The method of claim 1 wherein the number of pre-defined break points in the programming pulse is at least three.

9. The method of claim 1 further defined by clocking an interval of non-loading of the memory array and maintaining loading for said fixed duration.

10. The method of claim 1 further defined by ramping up the programming pulse on a resume request prior to continuing the loading of said program or data.

11. The method of claim 10 further defined by ramping down the programming pulse on a break point occurring after a suspend request and simultaneously stopping loading of data.

12. A method of programming a non-volatile memory array using suspend and resume commands comprising:

(a) pre-defining a plurality of break points relative to time amidst a duration of a programming pulse of fixed duration;

(b) interrupting and resuming programming during the fixed duration upon interrupt and resume commands, the interrupting occurring at the next break point wherein programming is suspended, then resumes after a resume command;

(c) counting the duration of the programming pulse only when programming is not suspended.

13. The method of claim 12 wherein the number of break points exceeds the number of suspend requests.

14. The method of claim 12 wherein the break points are uniformly spaced in the programming pulse.

15. The method of claim 12 wherein the break points are non-uniformly spaced in the programming pulse.

16. The method of claim 12 wherein the number of pre-defined break points in the programming pulse is at least three.

17. A method of programming a non-volatile memory array using suspend and resume commands comprising:

(a) pre-defining a plurality of break points amidst a duration of a programming pulse of fixed duration;

- (b) after ramping a voltage to a programming level, beginning loading of a memory array with a program or data during the programming pulse;
- (c) issuing a suspend request during the programming pulse;
- (d) continuing loading of the memory array until a break point occurring after the suspend request, then suspending said loading and then ramping down from the programming level to a low voltage level;
- (e) issuing a resume request at the low voltage level to again ramp up to the programming level and then continue loading of the memory array;
- (f) repeating steps (c) to (e) until the programming pulse is complete.